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ABSTRACT

The versatility of the computer can be expanded considerably for young handicapped children by using input devices other than the typewriter-style keyboard. Input devices appropriate for young children can be classified into four categories: alternative keyboards, contact switches, speech input devices, and cursor control devices. Described are input devices meeting the following criteria: can be used with the Apple computer, can support software appropriate for young handicapped children, have been used successfully in a computer laboratory situation with young children, fit into an acceptable price range for educational settings, have good user support from developers or distributors, are readily available, and are easily installed. Popular input devices discussed include "Muppet Learning Keys," "Power Pad," "Adaptive Firmware Card," "TouchWindo," "Voice Master," "Multi-Switch Adapter Box," and switches such as the ones from Prentke Romich Co. and Zygo Industries, Inc. (Author/JDD)

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INPUT DEVICES FOR YOUNG HANDICAPPED CHILDREN

BY KAREN MORRIS, Ph.D

INTRODUCTION

Input devices are specialized peripherals whose job is to get information into the computer. Input devices can assume any reasonable configuration but their purpose is always the same. They generate information which is translated into a language the computer can understand, processed in the central processing unit, and output or displayed in a manner meaningful to the user.

The standard input device is the typewriter style keyboard that accompanies personal computers. However, the versatility of the computer can be expanded considerably by using alternative input devices designed with young children in mind. These devices have taken the form of expanded keyboards, joysticks, touch screens and switches. These alternative input devices are becoming more and more available. They are being marketed with software appealing to young children; in a price range appropriate for the educational setting, and in a form that makes installation, use, and maintenance acceptable to the classroom teacher.

The devices discussed below are intended to help the young learner make more sense out of the information he enters into the computer. They allow for meaningful visual, verbal or auditory enhancement to the cognitive process. They are not specialized devices intended to bypass impaired sensory functions such as vision or hearing impairment, but instead are intended to supplement the learning activity. While cognitive enhancement is the primary purpose of the input devices, increasing physical access to the computer information is also important. Many programs developed for young children allow for a simplified use of the keyboard by requiring activation of only 1 or 2 keys to operate a program or by allowing all keys in a particular zone or portion of the keyboard to produce the desired results. These are creative and helpful ways to solve the keyboard input problem but either limit the options available to the child (the 1 or 2 key response) or requires the child to enter information using visual information which makes little cognitive sense (using all keys on one side of the keyboard). The goal of alternative input devices for young children is to provide the child with an input device which allows easy entry of information and also provides visual

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and/or auditory information which complements the learning situation.

A Conceptual Classification

Conceptually input devices appropriate for young children can be classified into 4 categories: alternative keyboards, contact switches, speech input devices, and cursor control devices (technically, these categories overlap considerably).

Alternative Keyboards: Alternative keyboards are input devices which substitute for the standard computer keyboard and provide a larger and/or modified keyboard surface which is more meaningful or suited for a particular group of users. Most alternative keyboards connect through the game port. Others, which are more versatile, use a keyboard emulator. Keyboard emulators are devices connected to the computer that read input sources other than the computer keyboard and sends input information to the computer as if it had come directly from the computer keyboard. This allows any software which was developed to be used with the computer keyboard to be used with an alternative input device. Without the keyboard emulator, input devices must rely on software developed specifically for a particular device.

Contact Switches: Contact switches are switches which use pressure to force contact to activate the switch. These include tread, push button, sliding, sip/puff to name a few. The switches are used in place of the keyboard and usually plug into the game port. Like alternative keyboards, they must be used with software designed specifically for switches unless used with a keyboard emulator.

Speech Input Devices: Speech input devices are voice or sound recognition devices designed to control the computer by voice command. The computer stores voice patterns recorded by the user. Incoming patterns are compared to those stored and used to print graphics or activate a device, e.g., the printer. Speech input devices are only beginning to reach the market at a price suitable for classroom use. While speech input is an ideal input method for young children both the technology and software need development.

Cursor Control Devices: These are devices developed specifically to allow easy movement and control of the

cursor. Most familiar are the joystick, track ball, or mouse.

Popular Input Devices For Young Children

The most popular input devices for young children are alternative keyboards and contact switches. Touch screens hold a great deal of promise. Touching objects on the screen seems to be a very natural response for young children. Speech input devices need technical improvements and software development to be useful. They are hopeful devices for the near future. Cursor control devices, while popular in games and business software, have not been frequently used in educational software designed for young children.

With these classifications in mind, consider some of the popular input devices. Be aware that it is not a complete listing, nor is it necessarily representative of only the best devices. The touch sensitive devices do, however, meet the following criteria:

They can be used with the Apple computer.
They support software appropriate for young handicapped children.
They have been used successfully in a computer laboratory situation with young children.
They fall into a price range acceptable in an educational setting.
The developers or distributors provide good user support.
They are readily available.
They are easily installed.

There are other input devices on the market which meet this criteria. Closing the Gaps' 1986 Resource Directory is an excellent source of information on other input devices available.

Muppet Learning Keys $79.95

Koala Technologies, Inc.
3100 Patrick henry Drive
Santa Clara, CA 95052

The Muppet Learning Keys is a sturdy touch sensitive alternative keyboard packaged in a 13.5" x 14.5" x 1" case with a 9.5" x 12.25" working surface and weighing 2.25 pounds. A carrying handle and cord wrap makes it easy to move and store. The Muppet Keys come with a permanent and rather busy keyboard overlay which groups the keys by numbers, colors, letters and arithmetic symbols. Special keys are designated for starting and stopping the program, obtaining help and moving the cursor. These special

function keys are combined with pictures of the Muppet characters - hence the Muppet Learning Keys name. Slightly raised areas in the overlay indicate the keys. They are activated by pressure.

The keyboard is plugged into the game port of the computer by a permanently attached cord.

The Learning Keys will operate only with software designed specifically for this keyboard. A Discovery disk, appropriate for young children, is packaged with the keyboard. However, the most promising software for young children is being produced by Sunburst Communication and Peal Software. Sunburst has developed at least 6 early education and early elementary level academic programs compatible with the Muppet Learning Keys. Peal software produces programs designed to enhance language development. They are compatible with the Echo or Cricket speech synthesizer and provide plastic keyboard overlays.

For those interested in developing their own BASIC programs, a Muppet Tool Kit is available from Sunburst. This disk will help programmers read the Learning Keys and add routines which will use the features of the Muppet Learning Keys to their own software.

Power Pad $99.95

Dunamis Inc.
2856 Buford Highway
Duluth, GA 30136
(404) 476-4934

The Power Pad is an alternative keyboard with outside dimensions of 20" x 17" x 1.5" and a surface area of 12" x 12". It weighs 4.5 pounds. A side handle in the plastic case makes it easy to hold or store near the computer. Programmable keys can be configured out of 14,000 touch sensitive command points arranged in rows and columns on the surface. Framed plastic overlays appropriate to the software are snapped on to the working surface of the Power Pad. The Power Pad plugs onto the internal game connector of the Apple circuit board with a detachable 16-pin DIP plug.

Individual developers are producing a range of software compatible with the Power Pad. Bear Jam, distributed by Dunamis, is a general reading readiness program appropriate for young children. The overlay groups keys according to shape, game and flavor. Special keys are also designed for using the custom options on the Bear Jam software. Touch Com distributed by Don Johnson Developmental Equipment is compatible with the Echo Speech synthesizer and allows

customizing of the keyboard. The program is intended primarily for non-verbal pupils.

The Power Pad can be programmed in BASIC, LOGO, or E-Z PILOT.

Unicorn Keyboard with the Adaptive Firmware Card

Unicorn Expanded Keyboard Model I $295.00

Unicorn Engineering
6201 Harwood Ave.
Oakland, CA 94618
(415) 428-1626

Adaptive Firmware Card $400.00

Adaptive Peripherals
4529 Bagley Ave. N.
Seattle, WA 98103
(206) 633-2610

The Unicorn Keyboard is a large acrylic expanded keyboard designed to be used with the Adaptive Firmware Card as the keyboard emulator. This allows the Unicorn to operate with almost all software designed for the Apple Computer. The keyboard measures 11.25" x 21.25" and weighs 3.75 pounds. The touch sensitive keys are mounted flush in a .5 inch acrylic base and covered with a clear plastic overlay. Each of the 128 keys can be programmed individually or grouped. The Unicorn is connected to the computer by cable through the I/O box of the Adaptive Firmware Card. The Unicorn can be used as a standard keyboard or customized through the use of Adaptive Peripherals' software.

The Adaptive Firmware Card serves as the interface to the computer. It is a keyboard emulator which consists of a printed circuit board attached to an external I/O box by cable. The card is installed by inserting into one of the expansion slots in the Apple circuit board. Routines can be added to and stored in RAM on the Firmware Card. The routines are maintained in RAM by battery. Thus the routines needed to customize the Unicorn Keyboard are readily available when the computer is powered up. The

customizing routines are used with user made overlays appropriate to the software.

Touch Windo $199.95

Personal Touch Corp.
4320 Stevens Creek Blvd.
San Jose, CA 95192

The Touch Windo is a touch sensitive input device that can be mounted directly on the monitor and used as a touch screen or used with an overlay as a touch tablet. Because the Touch Windo is built to be mounted on the monitor it is smaller (10.25" x 12") and lighter (1 lb.) than the alternative keyboards. The clear windo surface can be activated either by touch or with a rubber tipped stylus. The Touch Windo is easy to clean and, when mounted on the monitor, durable enough to be used with young children. The Touch Windo plugs directly into the game port of the Apple and attaches to the monitor with velcro-like strips. This makes the Windo easy to attach and remove.

Software using the Touch Windo as a touch screen, has been developed by Sunburst Communications. Six software packages are available that are appropriate for early childhood and early elementary learning. Several of these packages also work with the Muppet Keyboard. One of the most creative, Touch and Write, teaches penmanship by writing on the Windo while attached to the monitor.

A Touch Windo Tool Kit is available for software designing.

Swithes $20.00 - $200.00

Prentke Romich Co.
1022 Heyl Rd.
Wooster, OH 44691
(216) 262-1984

Zygo Industries, Inc.
P.O. Box 1008
Portland, OR 97207-1008
(503) 297-1724

Switches appropriate for young children come in a wide range of prices and configurations. Children without specific physical handicaps will succeed best with a simple plate or push button switch which can be held comfortably in their hand and which gives clear auditory and tactile feedback. Switches plug directly into the game port, or when using more than one switch, into a switch interface. The open and closed apples on the IIe may also be used as switches. Switches which plug into the game port either

directly or through an interface, will work only with specialized software which has been designed for switch access or software which normally run through tne game port.

Picture Switches with the Multi-switch Adaptor Box

ComputeAbility
101 Route 46 East
Pine Brook, NJ 07058
(201) 882-0171

The Multi-switch Adapter Box allows switches to be used with any software normally run from the keyboard. The Adaptor Box containes 8 mini-phone jacks for connecting 1 to 8 switches. A 36 pin connector attaches the Adapter Box to the I/O box of the Adaptive Firmware Card (see Unicorn Keyboard above). The Adaptive Firmware Card acts as a keyboard emulator allowing the software to operate. A customized file must be created with the Adaptive Firmware Software Setup Disk which is appropriate for the software and the switches. Picture switches have the advantage of allowing the user to easily insert and remove a user developed picture on a symbol appropriate to the software such as a number or color or shape. This creates a great deal of flexibility. However, any switch which uses a mini phone jack connector may be used.

Voice Master $89.95

Covox Inc.
675 D Conger St.
Eugene, OR 97402
(503) 342-127

The Voice Master is a voice-recognition system that can be programmed to recognize and respond to voice input. The Voice Master unit is enclosed in a 3.5" x 5.5" box which connects through the game port. A miniature microphone and earphone headset connect to the main unit by jack. Demos such as a color recognition program show the potential that a voice recognition system has for young children. A recognition template is developed for each color. Once this is complete, speaking the colors will produce each color on

the screen. However, at this time, users must develop their own programs in BASIC.

Resources

Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570
(800) 431-1934

Peal Software
2210 Willshire Boulevard, Suite 806
Santa Monica, CA 90403
(213) 451-0997

Closing the Gap
P.O. Box 68
Henderson, MN 56044

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